GCOS

TECHNICAL SUPPORT PROJECT PACIFIC

Tarawa 91610 – Upper air sounding – Balloon release

QUARTERLY REPORT

OCTOBER - DECEMBER 2004

METEOROLOGICAL SERVICE OF NEW ZEALAND LIMITED

31 January 2005

1 Executive Summary

This is the second Quarterly report of the GCOS Technical Support Project – Pacific (TSP).

All GUAN stations presently active under the TSP (Penrhyn, Tarawa and Funafuti) have achieved good results this Quarter. Penrhyn remains the best station with only two flights from the number possible for the Quarter were missed. Radiosonde soundings commenced on 1 November, enhancing the existing radar wind programme. Soon after we changed the balloons from 350 to 700 gram with a corresponding improvement in termination heights – see Tables. The top burst heights are now above six hPa and very close to the TRQ of five hPa. Tarawa and Funafuti also performed well, both with five flights missed during the Quarter, mainly due to communications problems. With Met Office funding we are moving both stations to a commercial satellite service provider which we expect will solve the current problems. We will also change those stations from 350 to 700 gram balloons.

The old M28 hydrogen plant was replaced at Funafuti with a modern Proton Hogen 20 system, completing Proton installations at all three GUAN stations. A back up solar power system was also installed at Funafuti providing power to the Digicora ground station and communications PC. All of these projects were funded by the Met Office.

The GSN inspections training workshop was successfully completed at Melbourne by Garry Clarke. All attending countries were appreciative of the TSP assistance and the use of the GSN Inspection kits. Philippines and Malaysia expressed a wish to be able to use the kits. The workshop expressed a wish that we include a small GPS unit with the kits so that station locations could be accurately determined. The PI-GCOS coordinator has kindly supplied three units. Following mounting in the kits, the kits will be distributed to the countries.

We have enhanced our station performance monitoring this Quarter and further improvements are presently being evaluated.

2 TSP Stations

The following stations are provided for under the TSP provisions.

Station Nr.	Station	Country	GSN	GUAN
91490	Christmas Is (Kiritimati)	Kiribati		
91610	Tarawa	Kiribati		
91701	Kanton	Kiribati		
91503	Munda	Solomon Islands		
91517	Honiara	Solomon Islands		Note 1
91554	Tekoa Airport, Santo	Vanuatu		
91568	Aneityum	Vanuatu		
91631	Nanumea	Tuvalu		
91643	Funafuti	Tuvalu		
91650	Rotuma	Fiji		
91652	Udu Point AWS	Fiji		
91680	Nadi	Fiji		
91699	Oni I Lau AWS	Fiji		
91724	Nukunonu	Tokelau Islands		
91780	Lupepau'u	Tonga		
91789	Nuku'alofa	Tonga		
91801	Penrhyn	Cook Islands		
91802	Penrhyn AWS	Cook Islands		
91812	Pukapuka AWS	Cook Islands		
91831	Aitutaki AWS	Cook Islands		
91824	Rarotonga	Cook Islands		
91824	Hanan Airport	Niue		
92014	Madang	Papua New Guinea		
92035	Port Moresby	Papua New Guinea		Note 1
92044	Momote	Papua New Guinea		
91960	Pitcairn Is	United Kingdom Territory		

Note 1: GUAN Survey for Honiara and minor review for Port Moresby provisioned under TSP Agreement extension – Q3.

3 GUAN Station Performance

3.1 Overview

At present, three stations are supported under the TSP – Tarawa, Funafuti and Penrhyn. Routine operational expenditure for these stations is primarily provided by the Met Office, with some funding from WMO VCP for Penrhyn. We understand that WMO VCP withdrew from future funding support during this Quarter and that GCOS is reviewing whether it could take over the WMO VCP component. MetService provides some technical and administration support. The TSP enables the technical assistance already allowed for to be enhanced. As Rarotonga may be of interest for future GUAN applications we have included monitoring for this station but excluded any other reporting.

3.2 Tarawa Upper Air Programme

A total of 87 observations of a maximum possible of 92 were received. Three flights were not completed because of equipment failure and two were unaccounted for, although we believe that they were irretrievably lost as a result of communications. The equipment fault, in all cases, was a MW15 lockup. This fault is well known and occurs from time to time, with the Digicora.

The communication problems are much more significant for the operational use of the data where global models have ingest cut-off times of (we understand) H+3 hours. About 20% of all flights received during Q2 from Tarawa and Funafuti collectively did not meet the H+2 deadline that we use.

The Met Office has approved our proposal to utilize a commercial satellite service provider. Using modern technology the operating cost will be similar to the amount budgeted for local communication costs. We will start the project in Q3 but expect it will be Q4 when it is completed as there is software to be written to ensure that the satellite communications system remains restricted to only the upper air data.

The Proton performed satisfactorily.

3.3 Funafuti Upper Air Programme

A total of 87 of 92 possible flights were received. Five flights were not received at all, or recoverable, as a result of communications failures. The satellite communications system referred to in the previous section will also be provided to Funafuti.

The Proton hydrogen plant and ancillary equipment were successfully installed in December. This project was funded by the Met Office. Soon after commissioning, a small component on the power supply failed. Proton Energies has agreed to replace the item under warranty provided the failure is not as a consequence of a mains power irregularity. We are reasonably confident that this is not the case. To minimize the delay in restoring the Proton we have sent the spare power supply unit from our GCOS Regional TSP kit. We are confident that the local technician will have no difficulty in installing the component early in Q3. As for Tarawa, we left the M28 commissioned to accommodate any teething problems with the Proton. There is no consequential programme disruption.

3.4 Penrhyn Upper Air Programme

As we have come to expect, the Upper Air programme at Penrhyn operated very well during Q2. The technician completed his annual leave in October, which accounts for a lower number of “Possible” flights than the days in the month. Only

two flights were missed during the Quarter – one due to an equipment fault and one when he was recovering his stores from the boat. This included the final material for the GCOS Penrhyn Refurbishment project.

Radiosonde soundings commenced on 1 November using PTU radiosondes and 350 gram balloons. 700 gram balloons were introduced during November. Even with the 350 gram balloon the station achieved what is a record termination height for any "New Zealand" station using this balloon size and payload of about 12 hPa. With the 700 gram balloon now being flown, termination heights are usually between 5 and 8 hPa, close to the GCOS TRQ of 5hPa.

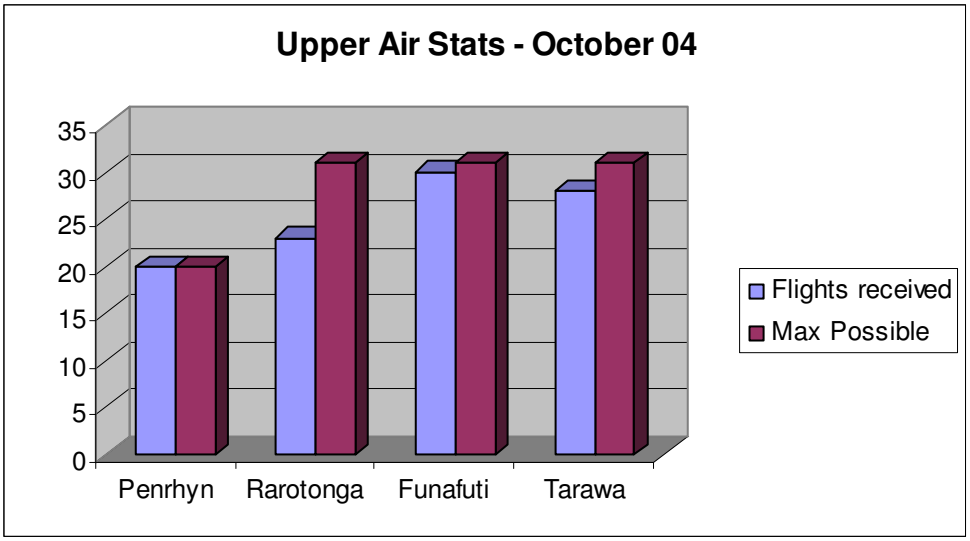
Steve Palmer, United Kingdom Met Office, and Tony Veitch visited the Cook Islands in late November for discussions on a MOU to cover the arrangement whereby MetService operates this Cook Island GUAN station on behalf of the Cook Islands. The background is as follows. The localization agreements in 1992, whereby New Zealand transferred the operation of the Cook Islands Meteorological Service to the Cook Islands Public Service excluded Penrhyn. From documentation of the time it seems that both Parties were in agreement that the existing arrangements be continued and that the station would close within a few years. With the support of GCOS (station refurbishment, radiosondes and possible operational funding ex WMO VCP, and the capital assistance (Digicora ground station and Proton hydrogen plant) of the Met Office it now seems much less likely that closure will occur.

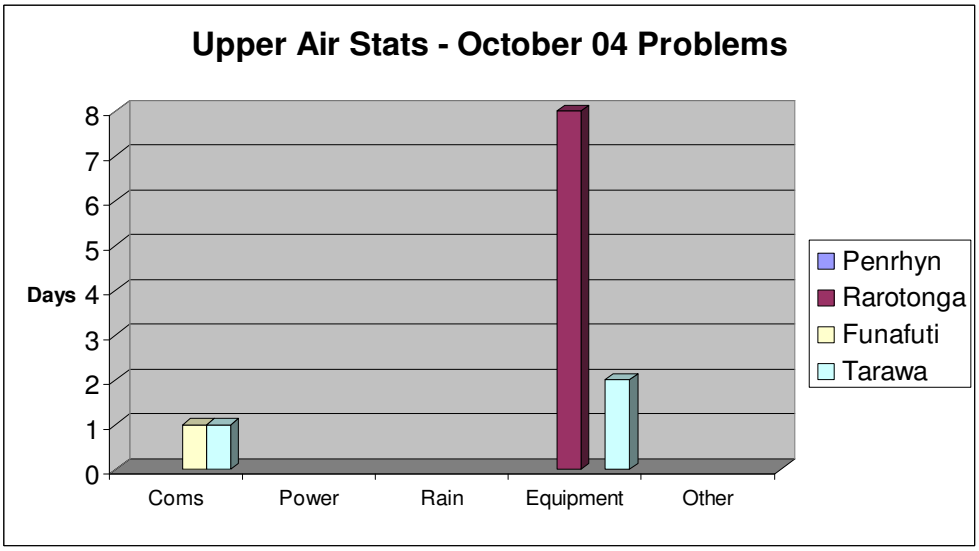
The Cook Islands and New Zealand are in agreement that the present operating arrangements continue and both Parties are working towards documenting responsibilities in a non-legally binding MOU. Meetings were held with the Director, Cook Islands Meteorological Service, Head of Ministry, and with the Cook Island Investment Corporation, that manages land titles on behalf of the Cook Island Government. The Cook Islands Crown Law Office has approved the proposed MOU and land lease matters are currently being checked by the Cook Islands before execution.

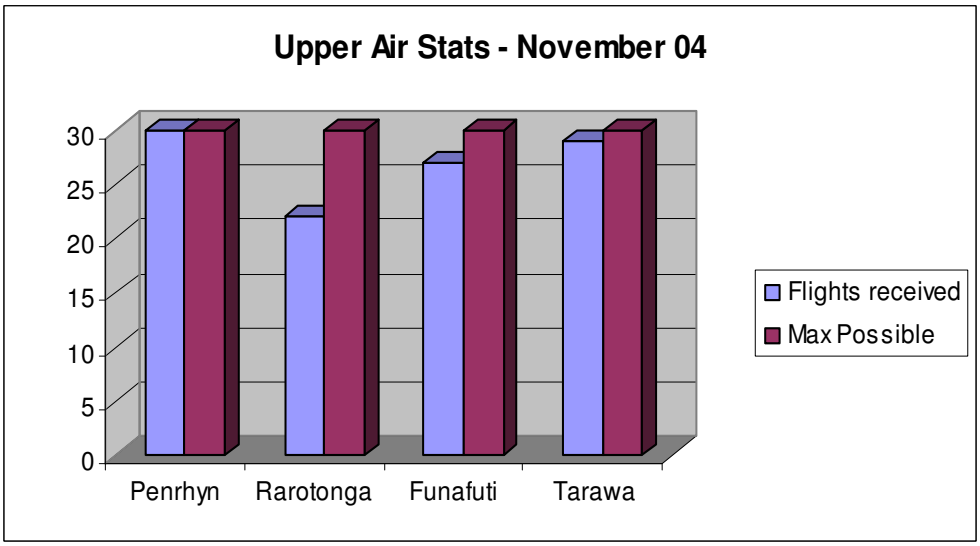
3.5 Upper Air Statistics

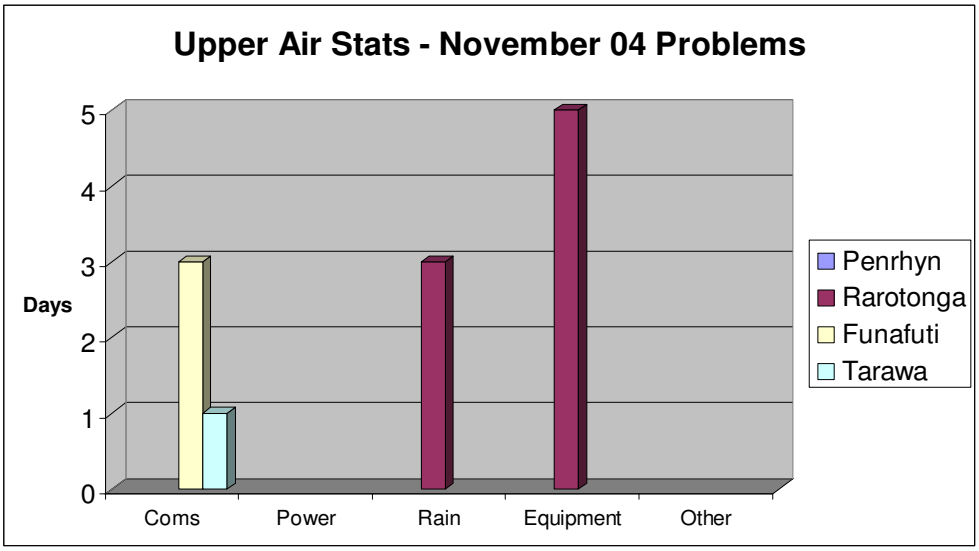
The charts are largely self-explanatory. The results overall are quite good.

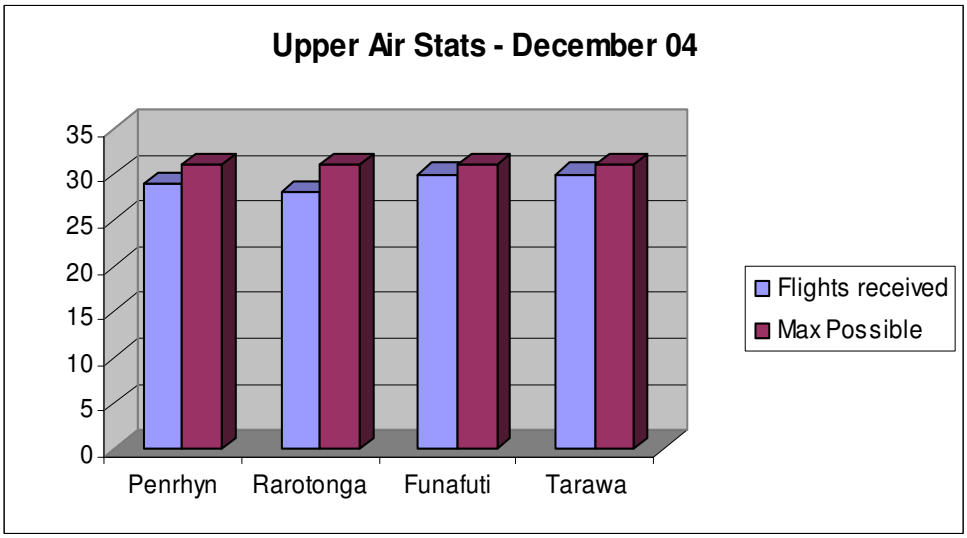
The "Problems" chart provides a breakdown of areas in which problems occurred at the stations. The "Other" category encompasses occasions when no information has been provided from the station and we have been unsuccessful in discovering the reason. It is also used for depleted stores. The "Rain" category applies to radar wind finding and signal loss due to strong rain echoes.

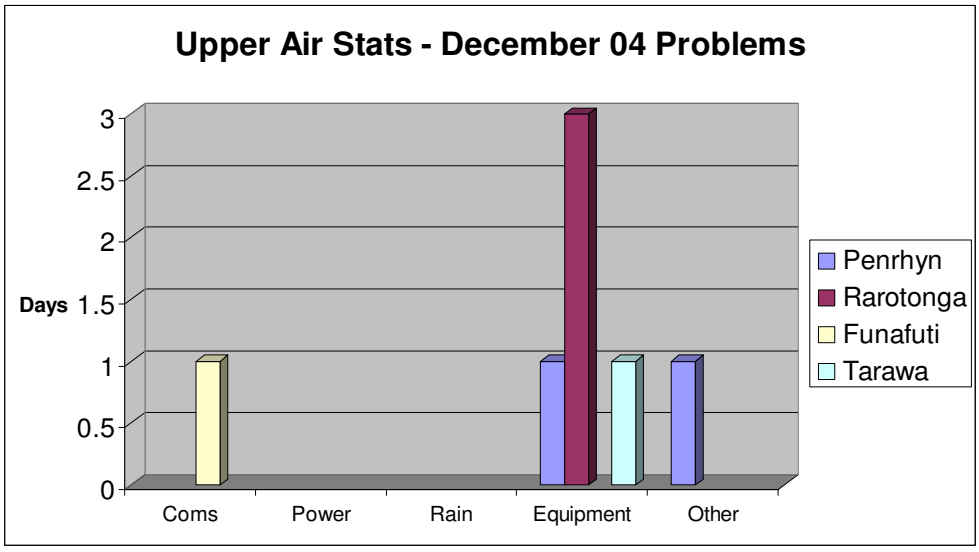

Upper Air Stats - October 04
35
30
25
20
15
10
5
0
Penrhyn
Rarotonga
Funafuti
Tarawa
Flights received
Max Possible


Upper Air Stats - October 04 Problems
Days
8
7
6
5
4
3
2
1
0
Coms
Power
Rain
Equipment
Other
Penrhyn
Rarotonga
Funafuti
Tarawa


Upper Air Stats - November 04
30
25
20
15
10
5
0
Penrhyn
Rarotonga
Funafuti
Tarawa
Flights received
Max Possible


Upper Air Stats - November 04 Problems
Days
0
1
2
3
4
5
Coms
Power
Rain
Equipment
Other
Penrhyn
Rarotonga
Funafuti
Tarawa


Upper Air Stats - December 04
0
5
10
15
20
25
30
35
Penrhyn
Rarotonga
Funafuti
Tarawa
Flights received
Max Possible

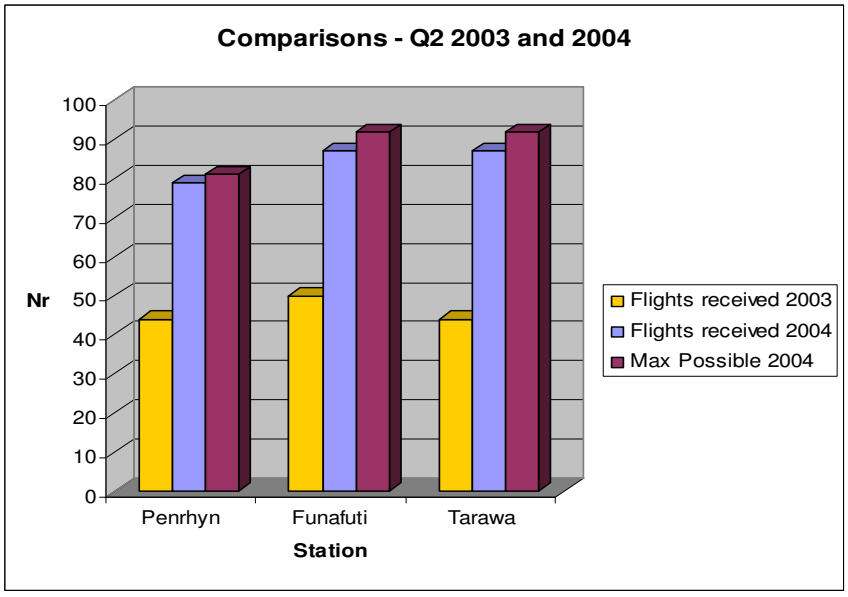

Upper Air Stats - December 04 Problems
Days
0
0.5
1
1.5
2
2.5
3
Coms
Power
Rain
Equipment
Other
Penrhyn
Rarotonga
Funafuti
Tarawa

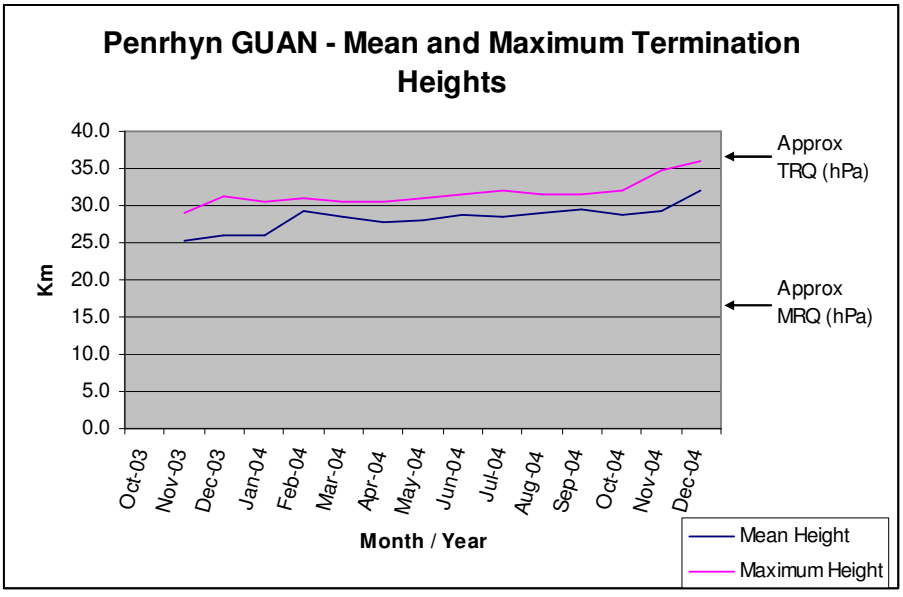
Note: Rarotonga is not currently a GUAN station and does not receive support under the TSP provisions.

3.6 Climate Temp Messages

Further to the re-establishment of Climate Temp messages at Tarawa and Funafuti in July 2004, we commenced providing these messages at Penrhyn from November 2004 when radiosonde was introduced.

3.7 Comparison of 2003 and 2004 Results





- Mean and Maximum Height data is not presently accessible for Tarawa & Funafuti.
- GCOS GUAN – Target Requirement (TRQ) = 5 hPa;
  Minimum Requirement (MRQ) = 100 hPa.

4 GSN Station Performance

4.1 Overview

Synoptic reports from GSN stations provide the input to enable the end of month Climate Message to be constructed for each station. Our focus to date has been on the GUAN programme – consistent with the GCOS priorities as we understand them.

In Q2 we added the GSN stations of Vanuatu and Solomon Islands to our monitoring programme. The charts reflect these additions. We hope to add the monitoring of Papua New Guinea stations during Q3.

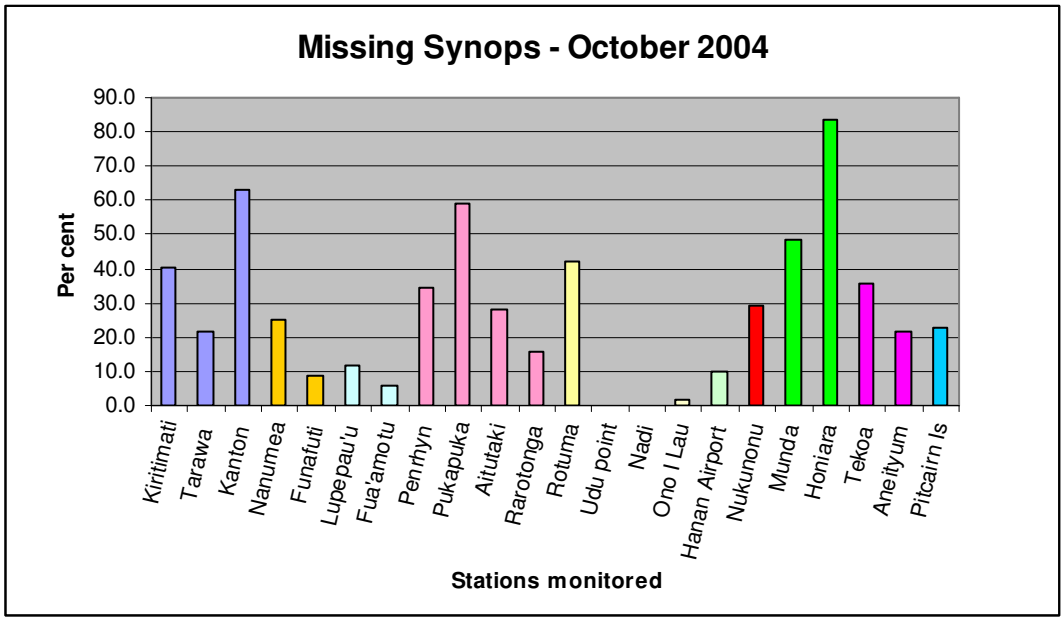
4.2 GSN Station – Missing Synoptic Reports

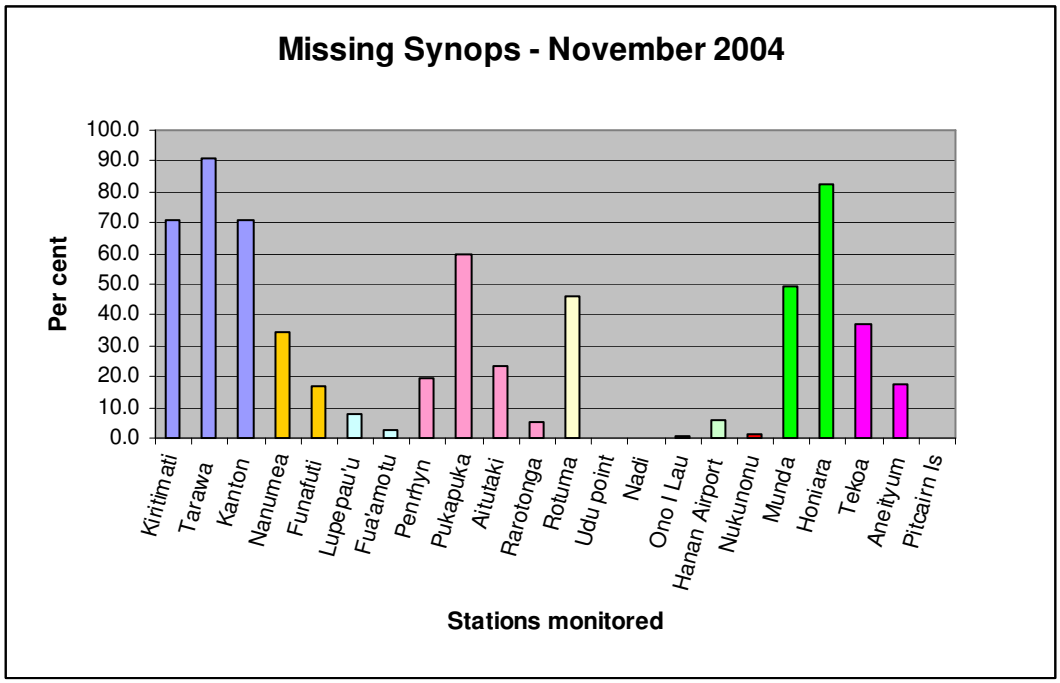
The chart shows the number of missing synoptic reports from the region's GSN stations that are passed through MetService's gateway or currently monitored by MetService. It does not take account of:

- Papua New Guinea stations.
- Reports that may have been received by the Meteorological Services' Head Offices but not on-forwarded to MetService.

The total number of synoptic reports possible is determined from WMO Tables showing each stations reporting programme. Where it seems that the advised reporting programme is not up to date, as far as practicable, we will adjust total number of synoptic reports used in the calculation.

Stations are "colour coded" according to country. Please refer to Section 2.


Missing Synops - October 2004
Per cent
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Kiritimati
Tarawa
Kanton
Nanumea
Funafuti
Lupepau'u
Fua'amotu
Penrhyn
Pukapuka
Aitutaki
Rarotonga
Rotuma
Udu point
Nadi
Ono I Lau
Hanan Airport
Nukunonu
Munda
Honiara
Tekoa
Aneityum
Pitcairn Is
Stations monitored


Missing Synops - November 2004
Per cent
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Kiritimati
Tarawa
Kanton
Nanumea
Funafuti
Lupepau'u
Fua'amotu
Penrhyn
Pukapuka
Aitutaki
Rarotonga
Rotuma
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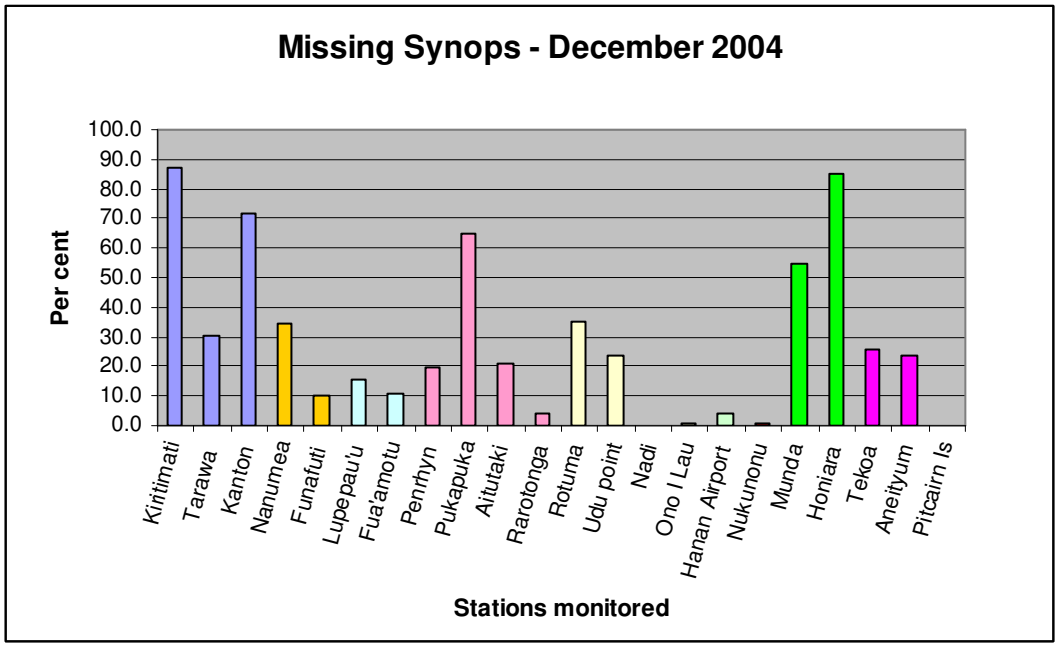
Aneityum
Pitcairn Is
Stations monitored



5 Project activity

5.1 GUAN Routine Maintenance

No routine maintenance work was completed under the TSP provisions in Q2. MetService engineers visited Tarawa late in Q1, and Funafuti late in Q2 to install a new Proton hydrogen plant and a back-up solar power supply. The budgeted visits remain scheduled for Tarawa in Q3 and Funafuti in Q4. There is a requirement for a new PC for upper air data processing at Tarawa, and installing and commissioning this will be completed during this visit. This will also be used for the satellite communications system.

5.2 GUAN Fault Maintenance

The power supply of the new Proton hydrogen plant at Funafuti failed soon after commissioning while the engineer was still in-country. Proton Energies has agreed to replace the component under warranty provided, after their examination of the component, they are satisfied that the failure was not due to external causes. We were monitoring the mains power during this period and we believe it was not a cause. We have sent the spare power supply from the TSP Regional Spares kit and that will be installed by the Tuvalu technician on receipt. The old M28 hydrogen plant was left in commission and no consequential disruption to the upper air programme has resulted.

Three fault maintenance trips were originally provisioned. As reported in Q1, with extra engineering visits for Proton installations, as well as routine maintenance visits, we were confident that at least one trip could be deleted. This assisted in enabling the GSN Training Course to be completed. As we are now half way through the TSP Year One, with the routine visits still to come, we are reasonably confident that another trip can be deleted and released funds be re-allocated to the completion of a GUAN Station Survey at Honiara.

This is shown in the Q2 Financial Statement (Q3 Forecast) and reflects the discussions amongst the stakeholders late in Q2. We understand that the WMO Procurement Office has agreed that it is appropriate in terms of the TSP Agreement and we waiting for the formal approval of the Project Monitor. *(Received late Jan 2005 for Honiara and Port Moresby)*

A cost-effective opportunity exists to briefly evaluate the requirements to re-establish Port Moresby GUAN Station as an extension to the Honiara survey if the GCOS Secretariat wishes. *(Now approved).* A MetService engineer installed a new hydrogen plant in December 1999 and re-commissioned the upper air station. We understand that it operated until a donated six-month supply of radiosondes was depleted. We suspect that there may not be a lot of capital requirements, that there will be some maintenance work necessary on the equipment, establishment of a basic, local, technical servicing capacity and full support for operating expenses. We have tried unsuccessfully to contact the Director and the most practical option, we suggest, would be to visit. The TSP may be able to accommodate the costs associated with this extension and we will calculate these if the GCOS Secretariat wishes.

Remote assistance was provided to Tarawa and Funafuti on a number of occasions for communications faults.

We are continuing to try and resolve the radar thyratron problem at Penrhyn. During Q2 we explored supply sources but the radar is now so old that the required thyratron is no longer in production. We are presently awaiting some physical specifications of the thyratron unit on the Penrhyn radar and we will then explore if we can manufacture an adaption that will allow an alternative thyratron to be used.

5.3 GUAN Ground Equipment consumables

No activity this Quarter.

5.4 GUAN Technical Spares

The power supply unit was used from the Proton Energies Hydrogen Generator Depot spares kit as reported. We are expecting this to be replaced under warranty.

The Vaisala Digicora regional spares kit has been purchased. Assisted by the contribution from the Met Office, this item has been obtained at about NZD 4,000 under budget.

5.5 GUAN Country reimbursement

Only minor costs are accommodated and for the presently assisted stations all reasonable in-country operating costs are provisioned.

5.6 GSN Establishment of Inspector's kits

The three inspector's kits have been completed according to specifications. However, during the training workshop we conducted at Melbourne, some countries suggested that a small mapping GPS unit as part of the kit would be beneficial. Mr Mark Morrissey, PI-GCOS Coordinator, has kindly supplied three units that we received in mid January. In accordance with the countries' wishes we may need to purchase some mapping software, at least for one of the units. At the end of January the engineers were mounting the GPS units in the kits. Once instructions and other documentation requirements are completed, we will commence dispatching the kits to countries for the respective GSN inspections

5.7 GSN Stations Training Course

Garry Clarke completed this activity at Melbourne in early December as a one day extension to the Climate Data Management workshop that was hosted by the Bureau of Meteorology.

As reported in Q1, the TSP covered the travel costs of the two non-member WMO countries – Tuvalu and Tokelau, but received the benefit of not having to fund all the other countries of the TSP. While not as comprehensive as we had originally planned, it enabled the training to be completed as part of the TSP and cost-effectively. Most of the costs have been expensed in Q2 and we expect the remainder to expensed early in Q3. The Financial Statement reflects this.

The concept of the GSN inspector's kits was well received by the workshop and, as reported in the previous section, some countries suggested that we should include a GPS unit in each kit as, in the case of one country, the geographic coordinates of some of its coastal station plotted out in the ocean. The early survey maps that had been used to establish the locations were in error.

All "TSP" countries were appreciative of the assistance that GCOS Secretariat was providing through the TSP. As the Climate Data Management workshop covered Region V, the Philippines, Malaysia and Singapore were also present. The Philippines and Malaysia expressed interest in being able to use the TSP kits and receiving assistance through the TSP.

5.8 GSN Stations Inspection costs

We are planning to commence with countries that have stations not requiring a lot of in-country boat travel. This will enable more stations to be completed sooner. The quarterly budgeted amounts for this component are likely to vary depending on the number of countries that are completed and when costs are applied.

5.9 Reserves

There have been no requirements to date. We are budgeting to use some of the reserves for the purchase of the two thyratrons for Penrhyn in Q3.

5.10 Programme management and administration

MetService's own systems provide the basis for the TSP monitoring of the performance of selected GUAN and GSN stations within the Southwest Pacific region. We adapted and enhanced the system during Q1. We added the GSN stations of Vanuatu and Solomon Islands to the programme during Q2. Further work is planned for Q3. While it is presently being evaluated we are planning to semi-automate the logging of receipt times of upper air messages (presently manually monitored by Garry Clarke, and from home during the weekends), add the Papua New Guinean GSN stations and monitor termination heights for GUAN stations in hPa instead of kilometers. These latter innovations will enable us to monitor performance in terms of TRQ and MRQ GCOS standards.

The dual-satellite AWS at Pitcairn Island has reported under two new station numbers since it was commissioned some five years ago. The GSN station has continued to be the manual climate station (91960). Recent discussions revealed that the reporting frequency of the manual station was insufficient to meet the requirements of a GSN station. Following consultation with the Met Office and technical areas of GCOS, it was agreed that the (New Zealand) "Campbell Island solution" be adopted. This is taking the reports from both AWS stations and creating one under a new station number. This new station becomes the GSN station. At the end of Q2, we were awaiting approval of the Met Office before writing the necessary software. Approval was received in January 2005 and we understand the Met Office will make the necessary WMO notifications and arrange for the Climat message to be constructed from the new report. The new station number is 91964. Mr Hans Teunissen, GCOS Secretariat, advised that where there are dual AWSs operating then the "Campbell Island solution" is the preferred option.

Further work was completed by Garry Clarke before the Melbourne workshop on the CliRep software.

As reported previously, CLIMAT TEMP messages were started at Penrhyn Island with the introduction of radiosonde on 1 November 2004.

Routine programme control of activities, coordination, financial planning, management and administration was undertaken during the quarter.

6 Project Activity Planned for Next Quarter

- Complete Tarawa Routine Maintenance visit.
- Resolve thyratron issue for Penrhyn including any adaptions required.
- Complete TSP kits for GPS units and commence allocation to countries.
- Establish a meta-data reporting system.
- Complete formal Honiara GUAN site survey, with Port Moresby basic evaluation to determine GCOS support requirements.

7 Financials

Under separate cover to TSP stakeholders.

8 Report Distribution

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